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was removed in such a manner by the Thunder and Lightning, that all People did admire it stood, and not fall upon the House. And tho' the People ran up and down in a great Consternation at the dreadful Thunder and Lightning, yet no body was hurt.

This Relation comes from the Minister who then officiated.

VI. *Some Microscopical Observations upon Muscles, and the manner of their Production. In a Letter from Mr. Anthony van Leeuwenhoek, F.R.S.*

Delft, June the 10th 1712. N. S.

I Have observ'd a great many Years ago, that the Shell Fish call'd Muscles, lay their Eggs upon the outside of their Shells; and that so regularly one by another, that they may be compared to a String or Band. These Eggs, or imperfect Muscles lying upon the Shells, do continually increase in Strength, till at last they come to be perfect Muscles; but then you may see remaining upon the Shells a part of the Egg-shell, which sticks fast to the said Shell, till the Skin or Membrane, wherewith the Muscles are encompassed, is changed.

In the Month of *August* 1710. I procured some Muscles, and dissected them according to the best of my Power; and found within the Shells on both sides of the Muscle, against the Parts of the Fish, very thin and weak Membranes; which I have taken often out of the Muscles, and placing them before a Microscope I have seen such a vast Number of Motions in the said Membranes; that it is not to be described either by Pen or Words; and I show'd the same likewise to other Persons: And

I observed those Appearances, not only in one, but all the Muscles I dissected, especially in such as had not been long out of the Water.

These Muscles don't lye single, but are at least three double on one another, and are composed of longish Fibres; and each Fibre has on both sides an unconceivable number of moving Particles. These Fibres are not extended length-ways, but in breadth, and each of them is provided with a great many Joints; insomuch, that I have been able to count 25 Joints in one of them, in the broadest part of the Membrane; and they lay as regularly and joyned one with another, as you may have observ'd in the little Bones that shoot out on both sides of the Back Bone of a Fish.

I placed a small Particle of the afore-mentioned Membrane before a Microscope: And tho' that Particle was not the hundredth part so big as a common Grain of Sand, yet I discover'd such a vast number of Motions in the said small Particle that was broken off from the Membrane, that it is incredible to any body but those that have seen it: And those Motions were not only Circular, but I could discover at least 50 slender Particles in the length; which appear'd through the Microscope of equal size to 6 Hairs breadth, and the thickness of one Hair, as they appear to the naked Eye: And these Motions continued so long, till our Eyes were weary of viewing them; but as soon as the moisture of the Muscle, in which the said Particle lay, was evaporated, the Motions were ended. The exceeding small Particles that lay round about, were put into such a Motion, that one would have taken them for little living Creatures.

I have endeavour'd for several Years to discover the *Ovarium*, or Egg-Nest, in the Muscles; and now lately, upon the 18th of *November*, there was a Present made me of exceeding fine and well tasted Muscles; some of which

which had placed their Eggs in part upon their Shells, and others had no Eggs upon their Shells. This occasioned me to dissect several Muscles again; whereupon at last I discovered the *Ovarium* of the Muscle, and in a great many of them could see the unborn Muscles as perfect, as we could see them with our naked Eyes; lying with their sharp end fastned to the String, or Vessels, by which they receive their Nourishment.

A few Days after my fore-mentioned Discovery, some Muscles were brought me to buy, which were very lean, like some of the first Muscles; and among 'em I observ'd about 25 that had not yet placed their Eggs upon their Shells, but most of them were still shut up in the *Ovarium*, from which I took a great Number of Eggs; which even through the Microscope appear'd so small, that I could but just discover the Figure of them. In some other Muscles the Eggs were bigger: And whereas the first unborn Muscles, which I judged to be so perfect, as to be ready to be placed upon the Shell, were of a brownish Colour mixt with little specks; so the very small Eggs were clear and transparent; but in the larger, one might discover some of the Parts of the little Fish within.

Moreover I took out of the *Ovarium* of one of the Muscles some Particles, that were as big as an unborn Muscle, and which were somewhat longer than broad; being very white, and some of them of a Particular Figure: So that I stood amazed, and began to consider with myself, whether these might not be some of those Creatures, which are so prejudicial to such as eat Muscles; as we had an Instance some Years ago of a Person, whose Body was so swelled with eating Muscles, that it was thought he would have dyed of it.

I turned my Thoughts afterwards upon the Consideration of the Excrements, or Food of the Muscle, as it lay in the Guts: And I observ'd a Gut, which had its

beginning, or rather its ending, in the thinnest part of the Fish (where the Shell opens when the Muscle is in the Water;) and which Gut was very near the extreame part of the Fish, and run into that part where the Stomach is. I have often separated this Gut from the Fish; and squeezing the Matter out of it, I always observ'd that the Earthy Matter, which was in the Gut, was mingled with a great Number of Grains of Sands of different Magnitudes; insomuch, that I judged that there was above a Thousand Grains of Sand in one Gut; some of which were as large as the Sand upon the Sea Shore; but others again so small, that a Thousand of them were not equal to one of the afore-mentioned great Grains of Sands.

I took a second Gut out of the Muscle, which lay deeper in it; and therein I also discovered as great a quantity of Sand.

I have likewise squeezed the Matter out of the Guts of some Muscles, in which I found but few Grains of Sands.

Having examined the two fore-mentioned Guts, I imagined to myself, that one of them might be that which carried the Food to the Stomach, and the other that which carried it off after that it was turned into Chyle.

I pursued my enquiry into the Gut, which was the outermost, till I had brought it to the Part which I took for the Stomach; and there also I discovered as many Sands in the Matter that lay within it, as I had done before in the Guts; and one might make greater Discoveries in Muscles, were not the Parts of them so soft and weak.

Since my last Account, I have made several Observations upon these Matters; and now lately upon the 20th of *January* last, having dissected some Muscles, I discovered not only a great many Sands in their Stomach, but

I also observ'd many long and very clear Particles; the longest of which, as far as I could judge, was about the Diameter of a Hair of ones Head; others were not a fourth part so long; and by the guess of my Eye, their thickness was not the eighth part of their length; and they were as clear as Crystal: so that I imagined them to be Salt Particles.

I also observ'd several little Particles in the Matter I took out of the Stomach, which I concluded to be Grass, or something like it. They were compos'd of very small Tubes or Pipes, which I suppose to be the small Parts of Grass; for the Pipes were much too small for any Straw.

In that Matter that I took out of the Stomach, I likewise observ'd several very small *Animalcula* swimming; and had not till now perceiv'd the Stomach so full of Food, nor of so thin a Substance as this was.

I have moreover observ'd, that in all the great Number of Muscles I have open'd, there were *Ovaria* or Egg-Nests in them; and I have taken the Eggs out of them: And in those that I open'd latest, I observed that the Eggs were bigger than I had seen any before. So that I concluded that all Muscles brought forth young ones; and that the Eggs that were found on the outside of the Shell were not all laid by the Muscle itself; but that other Muscles did also lay their Eggs upon each others Shells; and accordingly I have observed some Shells that were covered all over with Eggs.

During the motion of those Parts that have been mentioned above, which I shall here call the Beard of the Muscle, I have observ'd several times two or three *Animalcula* swimming; and the small Parts that lay round about were put into such a Motion, that one would be apt also to take them for *Animalcula*. And according to my Judgment, after several Observations, if not all, yet at least most of the Shell Fish, bring forth young with-

out.

out the help of Males : So likewise I believe it is in Oysters ; and I am also of Opinion, that that exceeding Number of small Particles, which I discovered in them, and which I took for *Animalcula*, are nothing else but the Parts put into a violent Motion : But these are not Observations, but guesses in relation to the Oysters. But if one dwelt upon the Sea Shore, and could daily view the Shell Fish, one might speak with greater certainty and satisfaction concerning them.

I never made so many Observations, nor with so much Pains, as I have done in the Business of Muscles : But not being able to do it with Satisfaction, my wishes are, That the Discoveries about the Production of Shell Fish, may be enter'd upon by some body else ; for as for my own Part I give it up ; and with great Respect I remain

Your most humble Servant.

Anthony van Leeuwenhoek.

VII. *An Account of what appeared on opening the Body of — St. Johns Esq; who dyed of an Asthma, July the 2d 1705. Aged 72 Years. By the late Mr. William Cowper, Surgeon, F. R. S. Communicated by Dr. Hans Sloane, Reg. Soc. Secr.*

IT was remarkable, before the Body was removed from the Bed, whereon it lay Hours after Death, that the Blister in the Neck had discharged not less than a Quart or three Pints of *Serum* before I began the Dissection.